The Human Side of Data: Understanding Our Employees

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Agenda

1. Project Overview
2. Analytical Questions
3. Data Cleaning Process
4. Dashboard Breakdown
5. Conclusion & Insights

>Overview

>Demographics

>Income

1. Project Overview

The HR data was fragmented across multiple files, making it difficult to form a unified understanding of employees

The goal of this project is to integrate all datasets into one analytical model to support **:**

- **Workforce planning**
- **Retention strategies**
- **Compensation and salary decisions**
- **Performance improvement**
- **HR make more accurate, data-driven decisions**

Project Aim & Features

Integrate all HR-related datasets into a unified analytical model to uncover patterns that supports data-driven decisions in hiring, performance evaluation, salary planning, and employee retention

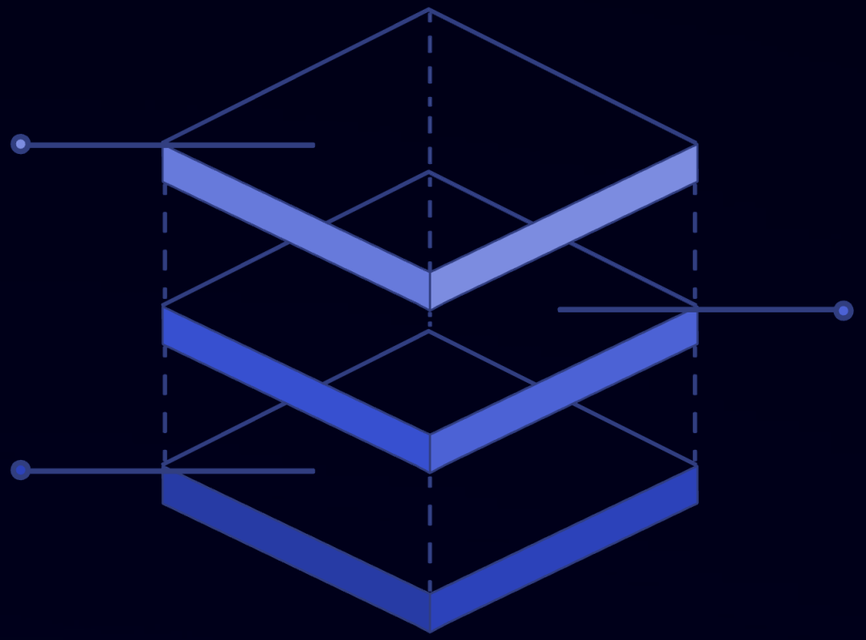
Key Features :

Hiring & Demographics

Strategic recruitment and understanding workforce composition

Employee Satisfaction

Core focus on engagement, feedback, and workplace happiness



Performance & Compensation

Analyzing performance and ensuring fair compensation structures

Dataset Overview

The project relies on multiple CSV files, each describing a specific HR function:

Employee Information

age, gender, state, department, role, years at company

Education Data

education level and major

Performance Ratings

manager score, self score, final rating

Satisfaction Scores

workplace satisfaction indicators

Hiring History

hire dates and 10+ years of trend data

Salary Data

annual salary, bonuses, and compensation structure

To provide a complete view of the raw inputs used before analysis

Initial Challenges

Structured cleaning issues before analysis :

1. Missing values
2. Inconsistent labels
3. Duplicate & incomplete records
4. Unstandardized date formats
5. Numeric values stored as text
6. Unclear Column meanings

Why Cleaning Was Critical

Trends become distorted

Correlations may be misleading

Business decisions risk being incorrect

Visualizations can misrepresent patterns

This step prevented misleading insights and improved dashboard accuracy

2. Analytical Questions

How did hiring change over the years?

What are the employee demographics?

How are salaries distributed across roles, genders, and ages?

What factors influence employee performance?

How do job roles and locations relate to workforce dynamics?

What patterns affect employee satisfaction and retention?

Key Questions Helps Us Driving the Analysis

Data Cleaning Process

We developed a reproducible cleaning pipeline using Python that included :

- Handling missing values
- Fixing text-based numeric fields
- Normalizing job role and department categories
- Converting dates to valid formats
- Merging all datasets into a unified master table
- Ensuring referential integrity across files

Here is a preview of the core data merging step used to unify tables:

```
# Load datasets
employee = pd.read_csv('HR/Employee.csv')
performance = pd.read_csv('HR/PerformanceRating.csv')

# Convert dates & numeric columns
employee['HireDate'] = pd.to_datetime(employee['HireDate'], errors='coerce')
employee['Salary'] = pd.to_numeric(employee['Salary'], errors='coerce')

# Merge tables
merged_df = performance.merge(employee, on='EmployeeID', how='left')

# Preview
print(merged_df.head())
```

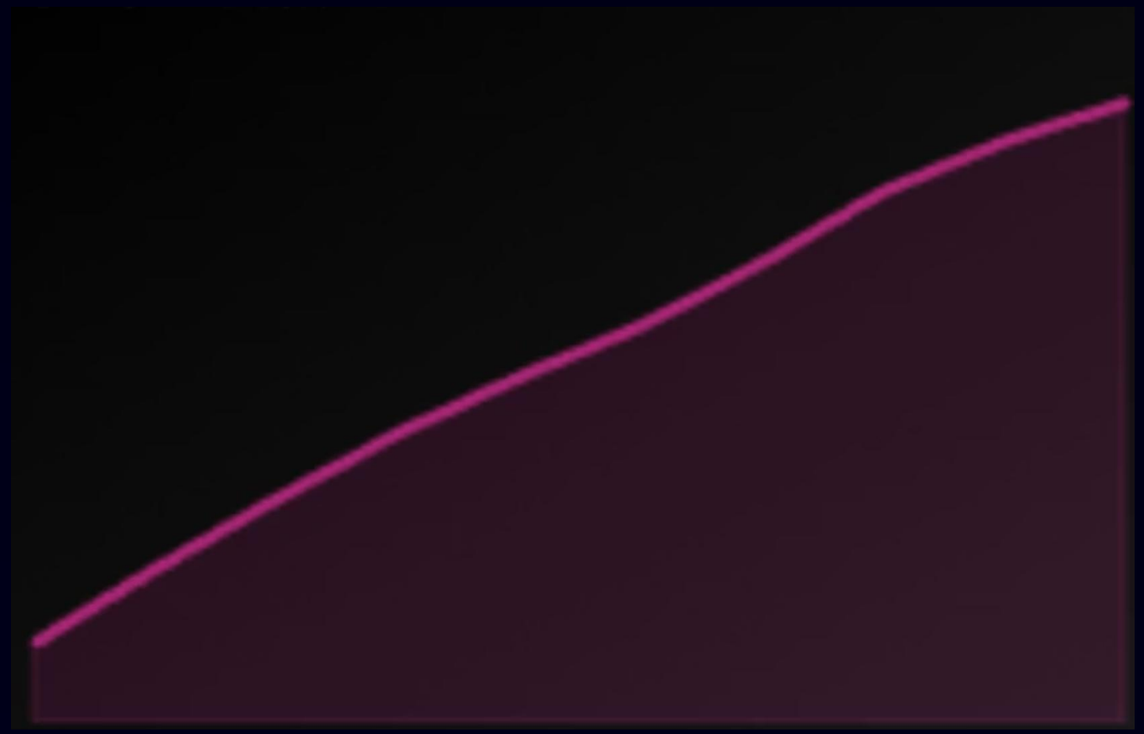
Employee overview

The location map shows :

- Total Employees: 6,709
- High-level snapshot of hiring and review activities
- Provides an overview of workforce demographics and performance

Review Status Analysis

- Completed reviews are increasing over time
- Shows steady improvement in the review process
- Helps HR track progress easily



Rising trend of completed reviews

Hiring Trend Analysis

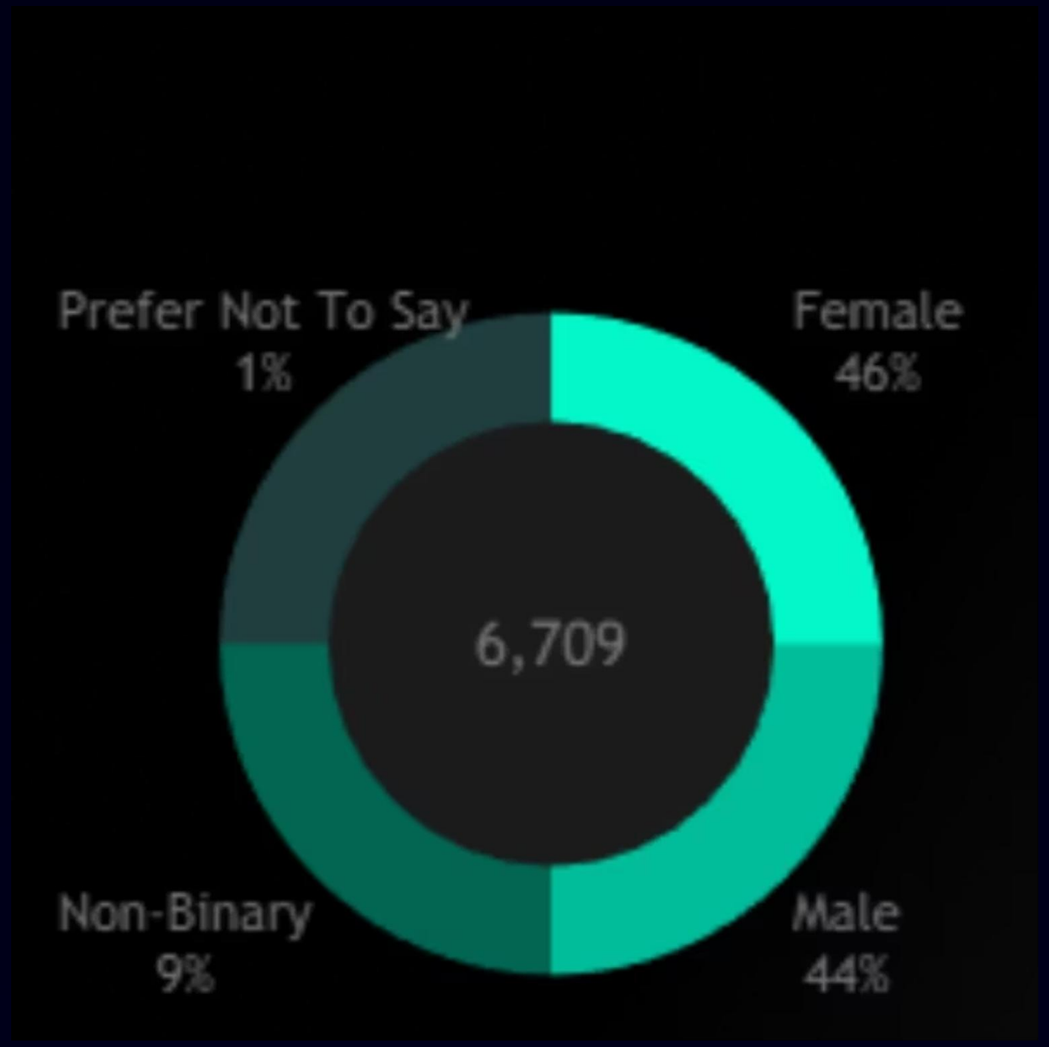
- Hiring has steadily declined over the past decade
- Reflects workforce changes and reduced recruitment
- Fewer new hires reflect workforce changes

Hiring Decline From 2012 to 2022

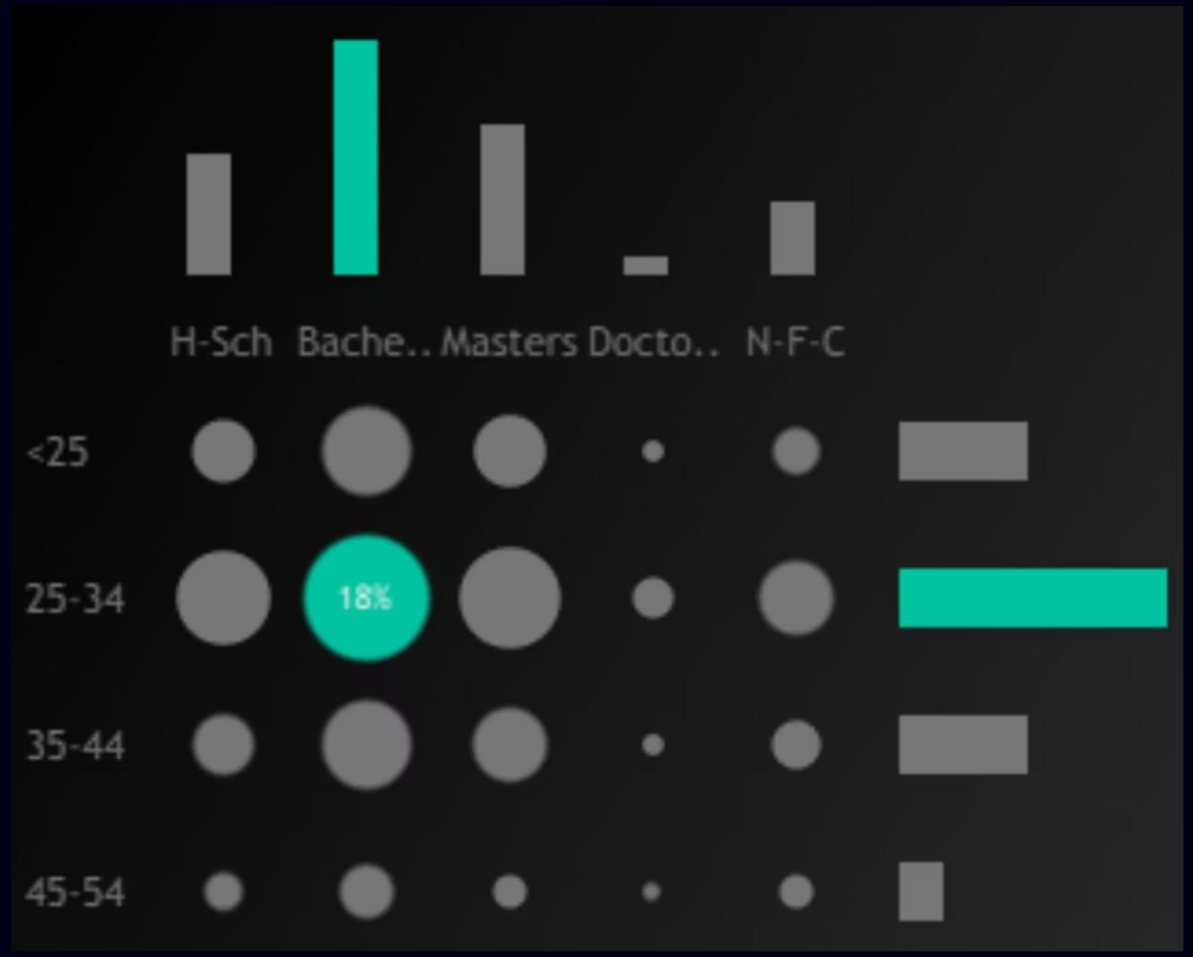
Workforce Demographics

Our demographic analysis shows:

- Concentration of employees in certain departments
- Age clusters linked to job roles
- Large variation in education levels
- Uneven distribution across states
- State/location representation imbalances
- Hiring concentration in specific Job families over time

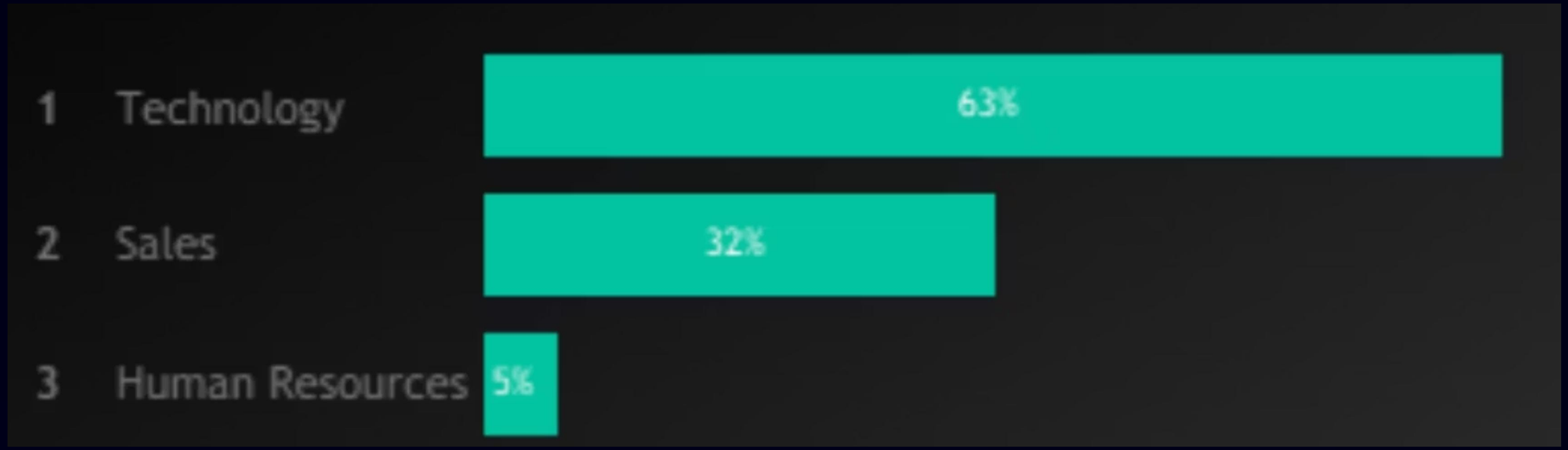


Gender Distribution



Education & Age

Departments distribution

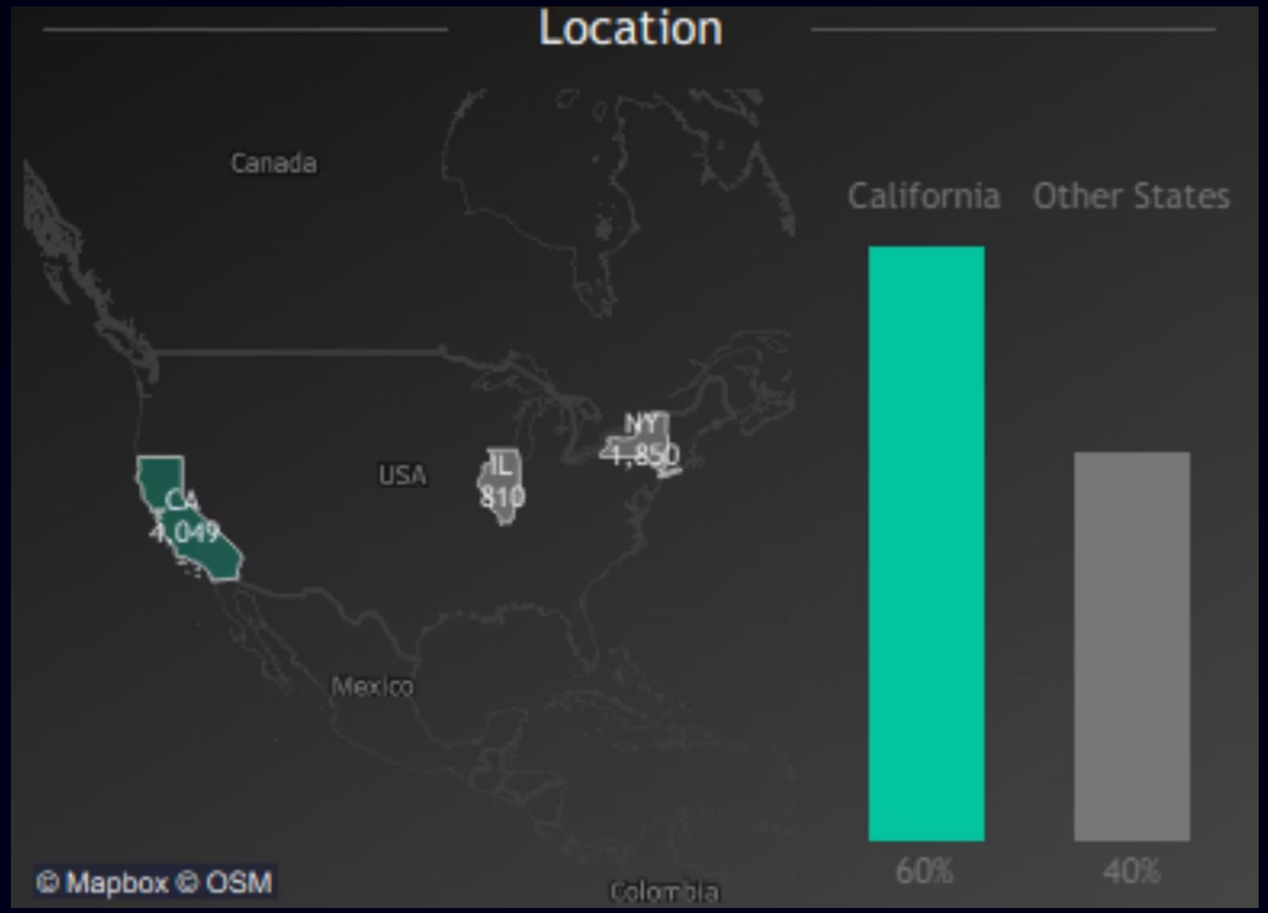


- Technology team represents the largest share 63%
- Sales makes up a significant portion at 32%
- HR is the smallest department with only 5%

Geographic

The location map shows :

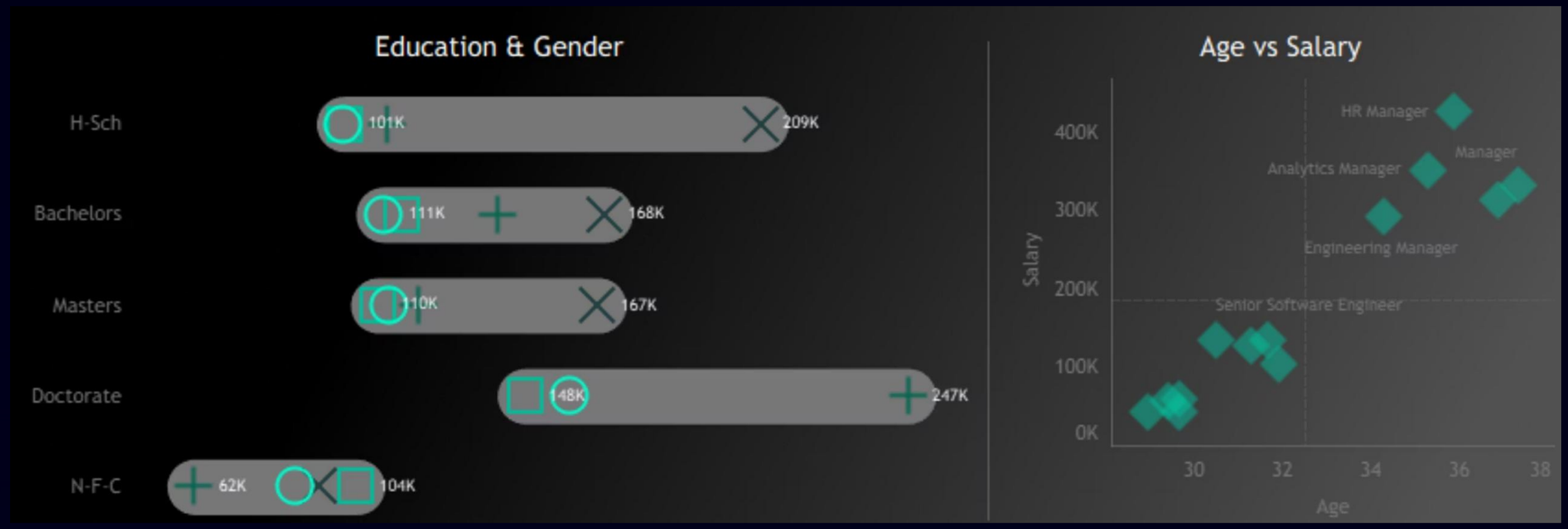
- Employee clusters appear clearly in major business hubs
- Lower staffing levels are visible in remote or low-activity regions
- These patterns help guide hiring plans, relocation decisions, and resource allocation



Salary Structure Analysis

higher education →higher salary

- Noticeable gender differences in several roles
- Salary increases with age until mid-career
- Company-wide average salary: $111,062



Performance Insights

Performance is influenced by:

- Education level
- Manager rating
- Training and development
- Years at the company
- High-performing departments

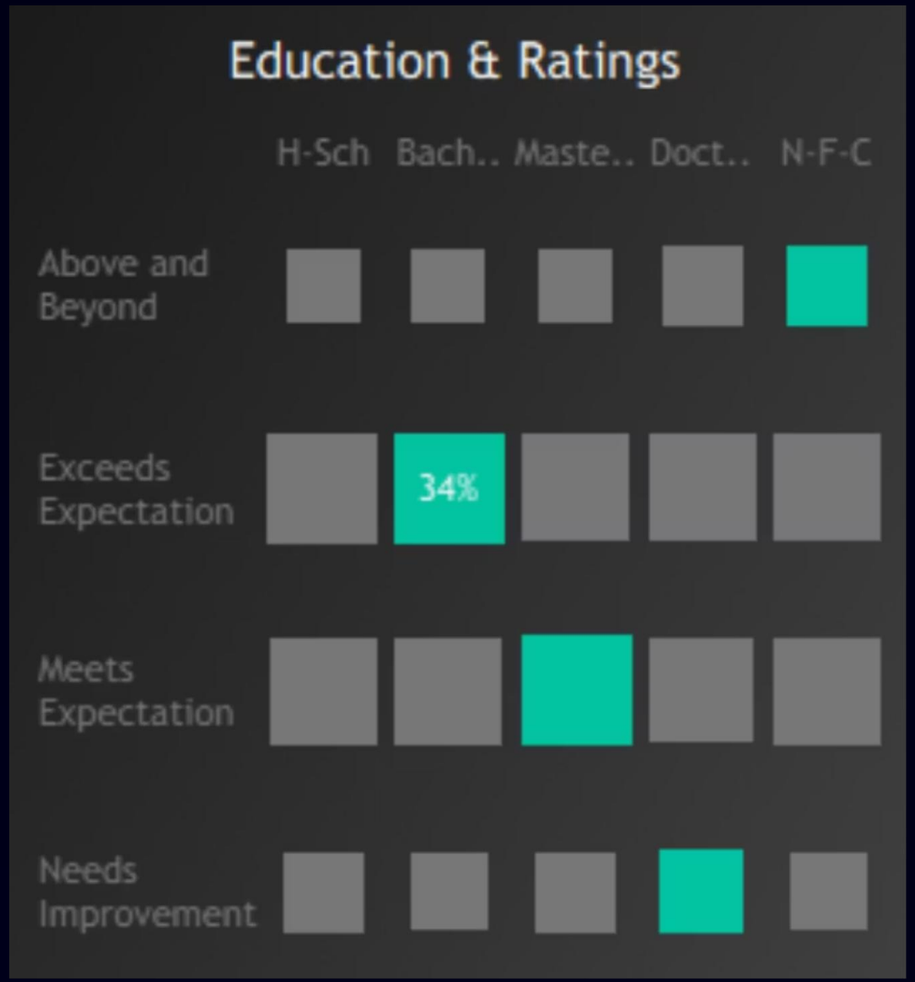
High-performing departments show consistent growth and better satisfaction

Education & Performance Ratings

Distribution of performance ratings by education level shows :

- employee performance across education levels (H-Sch → Doctorate + NFC)

- Bachelor: 34% rated as exceeds expectation
- Master: mostly meets expectations
- Doctorate: mostly needs improvement
- NFC: employees rated above and byonde



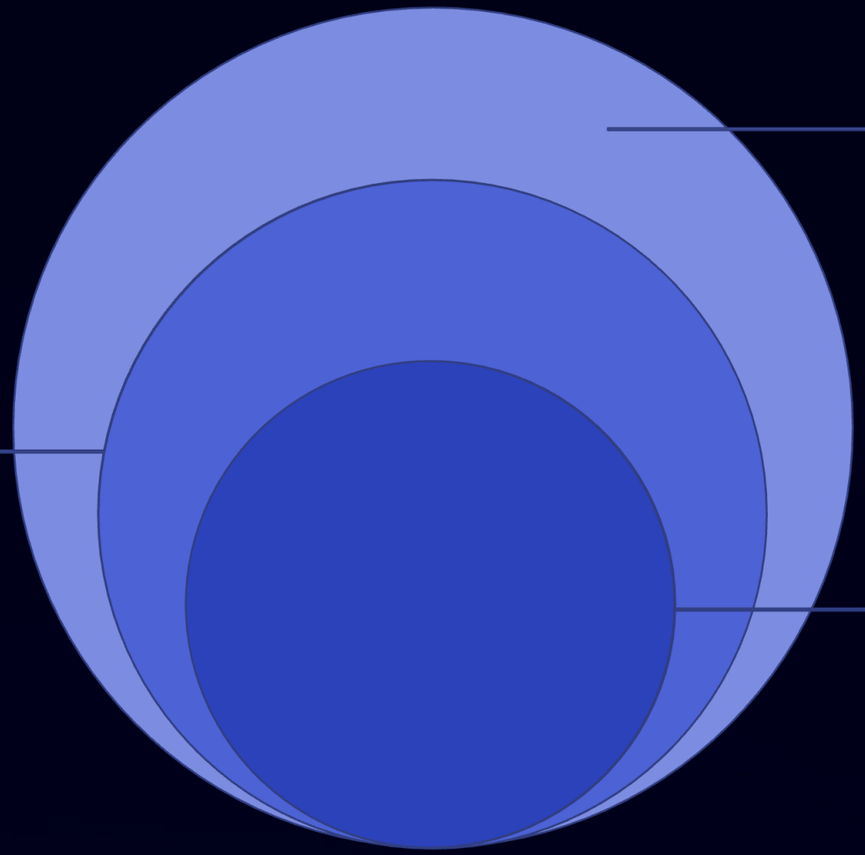
Satisfaction & Retention

Environment Satisfaction

is linked to better employee performance

Work-Life Balance

lower work-life balance is associated with higher turnover



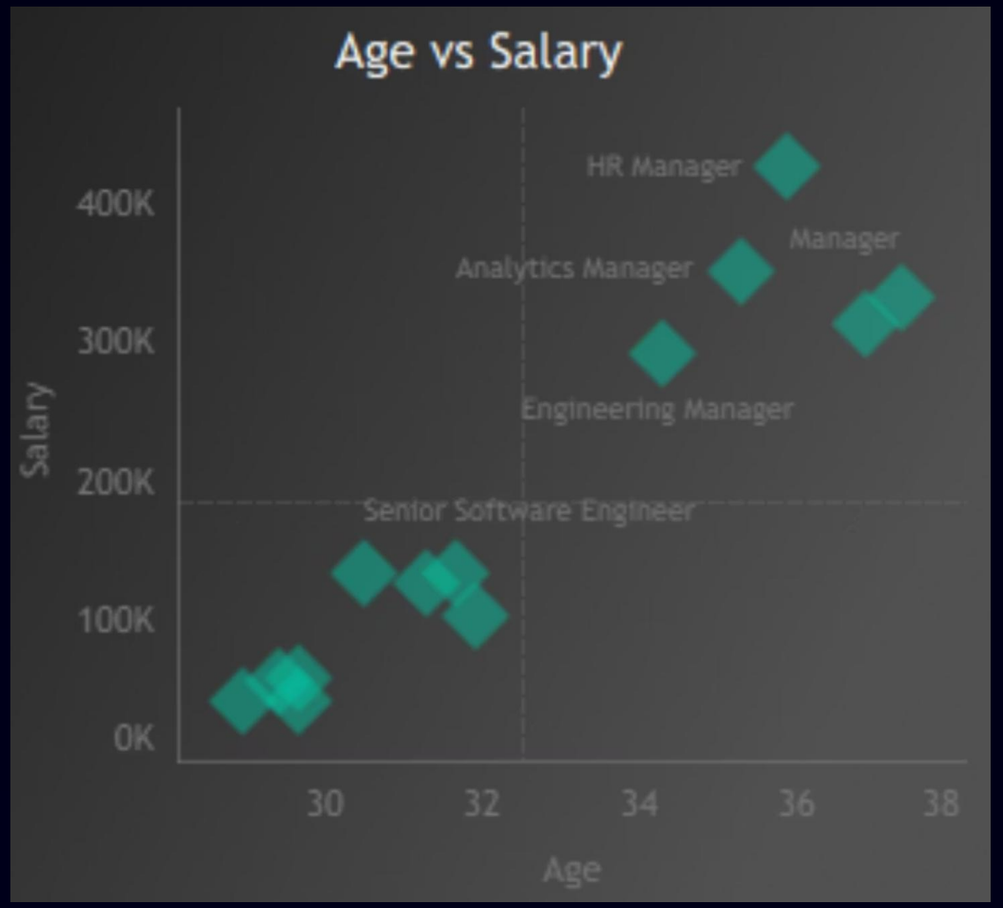
Employee Satisfaction

-Satisfaction varies widely deartments

-lower satisfaction have shorter tenure

Age vs Salary Analysis

- Shows how salary varies with employee age
- Salary generally increases with age and role seniority
- Highlights differences across departments or job roles
- Useful for planning & compensation decisions



Dashboard Demonstration

The Tableau dashboard enables HR teams to:

1. Filter by age, department, education, gender, and location
2. Explore hiring trends interactively
3. Compare salaries across roles
4. Detect outliers or anomalies
5. Identify high & low-performance clusters
6. Extract insights visually and instantl


Human Resources Dashboard | Overview
Filter
Gender
(Multiple values)
Location
(Multiple values)
Hire Date
(Multiple values)
Overview | Click to filter
Hired
Reviewed
Number of Employees
6,709
Hiring Status
Review Status
Departments
1 Technology 63%
2 Sales 32%
3 Human Resources 5%
Location
Canada
USA
Mexico
Colombia
CA 4,049
IL 810
NY 4,850
California
Other States
60%
40%
© Mapbox © OSM
Info
Export
Demographics | Click to filter
Gender
Prefer Not To Say 1%
Female 46%
Non-Binary 9%
Male 44%
6,709
Education & Age
H-Sch
Bache..
Masters
Docto..
N-F-C
<25
25-34
35-44
45-54
18%
Education & Ratings
H-Sch
Bach..
Maste..
Doct..
N-F-C
Above and Beyond
Exceeds Expectation
34%
Meets Expectation
Needs Improvement
Income | Click to filter
Education & Gender
H-Sch
101K
209K
Bachelors
111K
168K
Masters
110K
167K
Doctorate
48K
247K
N-F-C
62K
104K
Age vs Salary
HR Manager
Analytics Manager
Manager
Engineering Manager
Senior Software Engineer
400K
300K
200K
100K
0K
Salary
30
32
34
36
38
Age

Human Resources Dashboard | Details

Employees List

EMP. ID

Employee ID

Demographics

Full Name (All)

Age Groups (All)

Gender (All)

EducationLe.. (All)

Role

JobRole (All)

Department (All)

Geographics

Location (All)

State (All)

Salary

Salary $20,583 – $4,859,982

Status

Status (All)

Year of Hire Date (All)

Year of Review Date (All)

0A4E-1A4A	Aloysius Holdren 22 | Bachelors	Sales Executive Sales	CA	$53,014	Hire Date 2/4/2019
0A05-3943	Sherie Pattington 26 | Bachelors	Software Engineer Technology	CA	$33,273	Hire Date 1/20/2015
0AA2-881A	Jeffrey Mildmott 25 | Masters	Software Engineer Technology	NY	$29,126	Hire Date 7/18/2016
0AE7-DDE2	Martyn Rathke 23 | H-Sch	Machine Learning Engineer Technology	CA	$46,850	Hire Date 10/20/2018
0AF4-EC15	Gwenore Bernucci 24 | Bachelors	Sales Executive Sales	CA	$91,915	Hire Date 7/23/2018
0B19-EFB2	Ada Bynold 39 | Masters	Engineering Manager Technology	CA	$300,594	Hire Date 4/24/2018
0B49-32CD	Nettie Manwaring 20 | H-Sch	Data Scientist Technology	CA	$41,179	Hire Date 11/4/2020
0B72-0EE6	Noll Antoniottii 24 | Masters	Senior Software Engineer Technology	NY	$70,849	Hire Date 9/3/2016
0BAF-7454	Ninnette Braganza 26 | Masters	Software Engineer Technology	NY	$37,530	Hire Date 7/30/2017
0C6D-2825	Tann Lettley 21 | Bachelors	Software Engineer Technology	CA	$37,164	Hire Date 3/6/2019
0C7B-2EA6	Oswell McCloid 34 | H-Sch	Data Scientist Technology	NY	$39,015	Hire Date 9/15/2013

Info

Export

Key Findings Summary

1. Hiring has declined sharply over the last decade
2. Education strongly impacts performance & salary
3. Gender patterns indicate potential inequality
4. Performance depends on satisfaction & manager support
5. Average tenure is 5.7 years, indicating moderate retention
6. Certain departments show higher turnover or lower satisfaction

Recommendations

Addressing salary gaps across gender and education groups

Expanding training and development programs

Strengthening manager feedback systems

Improving recruitment strategies to reverse hiring decline

Prioritizing departments with low satisfaction or high turnover

Focus on high list high-risk departments

How the project can benefit companies :

- **Make Smarter Decisions**

  Unified HR data helps leaders act fast and confidently in hiring, promotions, and workforce planning

- **Boost Retention & Engagement**

  Spot trends affecting satisfaction and turnover to take timely action

- **Ensure Fairness & Transparency**

  Support equitable salaries and performance evaluations across teams

- **Plan for the Future**

  Build a foundation for predictive analytics and data-driven HR strategies

15. Conclusion

This project showed how organizing all HR data into one clear analytical model can turn scattered information into meaningful insights.By understanding trends in hiring, performance, satisfaction, and salaries, we identified both strengths and areas that need attention

Most importantly, the analysis reinforces that effective HR decisions rely on seeing the people behind the data—enabling fair, informed, and forward-focused planning for the organization

Finally, data becomes a tool not just for measurement ,but for empowering people and shaping a stronger workplace

Thank You